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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/044,638 | 10/19/2001 | David Patrick Magee | TI-32986 | 8619 |
| 23494 | 7590 | 09/15/2006 | EXAMINER | |
| TEXAS INSTRUMENTS INCORPORATED P O BOX 655474, M/S 3999 DALLAS, TX 75265 | | | JAMAL, ALEXANDER | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 2614 | |

DATE MAILED: 09/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/044,638

Applicant(s)

MAGEE ET AL.

Examiner

Alexander Jamal

Art Unit

2614

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-74 is/are pending in the application.
- 4a) Of the above claim(s) 1-53 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 54-74 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

1. Based upon the submitted amendment (7-24-2006) entered via RCE, the examiner notes that claims 1-53 have been cancelled and claims 54-74 have been added.

Claim Objections

1. Claims 53,65 objected to because of the following informalities:

As per **claim 53**, in line 8, "first type" should be changed to "second type"

As per **claim 65**, in line 6, "nose" should be "noise".

As per **claim 56**, in line 1 "claim 33" should be "claim 54".

Appropriate correction is required.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

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3. **Claims 54,60,65,73, 56,62,67, 57,59,63,68,71,72,74,70** rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir (6795409).

As per **claim 54**, Youssefmir discloses a beamforming method for a communications system where the system receives a signal that comprises data tones (second type) and training tones (first type) (Fig. 5C,5D). The combiner 229 of Fig. 2 performs channel estimation on the received signal in order to compensate for multipath (Col 7 line 60 to Col 8 line 12). The system estimates interference (noise) (Col 8 lines 1-12) and uses the estimates to allow the beamformer to mitigate the interference (Col 27 lines 1-11) via the smart antenna processing strategy. The smart antenna weighting parameters may be determined (computing beamforming) based on optimizing a parameter of an error signal (Col 6 lines 1-22) where the error signal is determined from a received training signal or tone (Col 27 lines 40-50) (Col 27 line 65 to Col 28 line 10). Since the error signal is used to mitigate the effects of interference and multipath, the error signal comprises a noise (interference) estimate and a channel (multipath) estimate. However, Youssefmir does not specify that the estimates based off a particular training tone are applied to the closest data tone.

Youssefmir's interference and multipath estimates may be determined from training tones in a time division or frequency division system (Col 29 lines 1-10). As such, It would have been obvious to one of ordinary skill in the art at the time of this application that the estimates made at a particular instant in time or a particular frequency on a particular tone should be applied to the closest data tones (in time or frequency) for the purpose that the training tone noise estimate (and hence the noise mitigation) will be

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the most accurate for the nearest data tone estimates (ie. you would not estimate noise @ 10KHz and apply it to signaling @ 10MHz).

As per **claims 60,65**, the claims are rejected for the same reasons as the claim 1 rejection. Youssefmir discloses the means within a communications receiver to perform the method of claim 53. The system inherently comprise a training tone extractor for the purpose of retrieving and processing the training tones.

As per **claim 73**, the claim is rejected for the same reasons as the claim 1 rejection. The system comprises an antenna (Fig. 2a,2b). The system inherently comprises an A/D converter for the purpose of converting the received analog waveforms into digital format in order to be processed by a DSP (Col 5 lines 1-6). The system may be an FDD system and processed in the frequency domain (Col 29 lines 1-10). There are less training tones than data tones (Fig. 5c,5d).

As per **claim 56,62,67**, they are rejected for the same reasons as claim 54.

As per **claim 57,59,63,68**, they are rejected for the same reasons as the claim 54 rejection. The received tones inherently require indexing (such as clocking or frame formatting for example) and extracting steps (and means) for the purpose of being able to retrieve, separate, and process the individual tones (both data and training).

As per **claim 71**, the system may be implemented as a DSP (Col 5 lines 1-6).

As per **claims 72,74**, they are rejected as per the claim 73 rejection.

As per **claim 70**, Youssefmir discloses the communications receiver as per the rejection above, but does not specify integrating any parts of the receiver.

It would have been obvious to one of ordinary skill in the art at the time of this application to integrate as many components of the system as possible for the advantage of improved manufacturability.

4. **Claims 55,58,61,64,66,69** are rejected under 35 U.S.C. 103(a) as being unpatentable over Youssefmir (6795409) as applied to claim 54,60,65, and further in view of Raleigh (6006110).

As per **claim 55,61,66**, Youssefmir discloses that a known signal may be used to form an error signal (noise/channel estimate) used in the beamforming (Col 6 lines 5-25), but does not give the specifics of the estimating process.

Raleigh discloses a beamforming system where interference (noise) is estimated in order to optimize the beamforming (Col 8 lines 10-45). The noise estimator computes the difference (error signal) between the received training signal and the previous training signal (Col 15 lines 25-40), calculates the variance and covariance (Col 11 lines 46-50), and then time averages the covariance (Raleigh Col 15 lines 1-10). It would have been obvious to one of ordinary skill in the art at the time of this application to use a known technique in the system of Youssefmir for the purpose of estimating the noise (error signal) used in the beamforming process.

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As per **claims 58,64,69**, Raleigh's system calculates soft decisions and noise to signal (SINR) for each of the tones (RALEIGH: Col 14 lines 10-21).

Response to Arguments

5. Applicant's arguments with respect to claims 54-74 have been considered but are moot in view of the new ground(s) of rejection.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander Jamal whose telephone number is 571-272-7498. The examiner can normally be reached on M-F 9AM-6PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Curtis A Kuntz can be reached on 571-272-7499. The fax phone numbers for the organization where this application or proceeding is assigned are **571-273-8300** for regular communications and **571-273-8300** for After Final communications.

AJ
September 12, 2006


CURTIS KUNTZ
SUPERVISORY PATENT EXAMINER
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